Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Perforated appendix admission rate: percentage of admissions for any-listed diagnosis of perforations or abscesses of the appendix per 1,000 admissions with any listed appendicitis, ages 18 years and older.

Source(s)

AHRQ QI research version 5.0. Prevention quality indicator 2 technical specifications: perforated appendix admission rate. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 2 p.

National Quality Forum measure information: perforated appendix admission rate (PQI 2). Washington (DC): National Quality Forum (NQF); 2013 Jul 2. 11 p.

Measure Domain

Primary Measure Domain

Related Population Health Measures: Population Use of Services

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of admissions for any-listed diagnosis of perforations or abscesses of the appendix per 1,000 admissions with any listed appendicitis, ages 18 years and older.

Rationale

Hospital admission for perforated appendix is a Prevention Quality Indicator (PQI) that would be of most interest to comprehensive health care delivery systems. With prompt and appropriate care, acute appendicitis should not progress to perforation or rupture. Rates for perforated appendix are higher in the uninsured or underinsured in both adult and pediatric populations, which may be caused by patients

failing to seek appropriate care, difficulty in accessing care, or misdiagnoses and poor quality care.

Perforated appendix rates vary systematically by race, although the cause is unknown. Areas with high rates of perforated appendix may want to target points of intervention by using chart reviews and other supplemental data to investigate the reasons for delay in receiving surgery. Hospital contributions to the overall area rate may be particularly useful for this indicator, because misdiagnoses and other delays in receiving surgery in an emergency room may contribute substantially to the rate.

Perforated appendix is a potentially avoidable hospitalization/ambulatory care sensitive condition indicator. These indicators are not measures of hospital quality, but rather measures of access to high quality outpatient care, and as such are defined with area level denominators.

Timely diagnosis and treatment may reduce the incidence of perforated appendix, and lower rates represent better quality care.

Evidence for Rationale

National Quality Forum measure information: perforated appendix admission rate (PQI 2). Washington (DC): National Quality Forum (NQF); 2013 Jul 2. 11 p.

Primary Health Components

Appendicitis; perforation; abscess

Denominator Description

Discharges, for patients ages 18 years and older, with any-listed International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for appendicitis (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Discharges, among cases meeting the inclusion and exclusion rules for the denominator, with any-listed International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for perforations or abscesses of appendix (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Perforated appendix occurs in one-fourth to one-third of hospitalized acute appendicitis patients (Braveman et al., 1994). Approximately 280,000 appendectomies are performed each year in the United States (Owings & Kozak, 1998). Most are performed as emergencies to avoid the complications of perforated appendicitis; an entity believed to result from delay in surgical removal of the appendix after the appendix has become inflamed. The fear of appendicitis complications results in more emergency

general surgical operations than any other disease (Livingston et al., 2007).

Negative exploration rates as high as 30% are considered acceptable for women presenting with lower abdominal pain (Larsson et al., 2001). A retrospective analysis for all patients 18 years of age and over with acute appendicitis between July 1, 2005 and December 31, 2008 at a teaching hospital identified 1003 patients with acute appendicitis of whom 239 (23.8%) had perforated appendix. Patients with public insurance were significantly more likely to have perforated disease (P less than 0.001) as were patients in the older age groups (41 to 64 and = 65) (35.8% and 38.24%, respectively, versus 19.2% for those 18 to 40; P less than 0.001). The patients who presented with perforation had a greater length of stay (2.71 ± 2.14 versus 6.04 ± 3.91 d, P less than 0.001) (Boomer et al., 2010).

Evidence for Additional Information Supporting Need for the Measure

Boomer L, Freeman J, Landrito E, Feliz A. Perforation in adults with acute appendicitis linked to insurance status, not ethnicity. J Surg Res. 2010 Oct;163(2):221-4. PubMed

Braveman P, Schaaf VM, Egerter S, Bennett T, Schecter W. Insurance-related differences in the risk of ruptured appendix. N Engl J Med. 1994 Aug 18;331(7):444-9. PubMed

Larsson PG, Henriksson G, Olsson M, Boris J, StrÃ¶berg P, Tronstad SE, Skullman S. Laparoscopy reduces unnecessary appendicectomies and improves diagnosis in fertile women. A randomized study. Surg Endosc. 2001 Feb;15(2):200-2. PubMed

Livingston EH, Woodward WA, Sarosi GA, Haley RW. Disconnect between incidence of nonperforated and perforated appendicitis: implications for pathophysiology and management. Ann Surg. 2007 Jun;245(6):886-92. PubMed

Owings MF, Kozak LJ. Ambulatory and inpatient procedures in the United States, 1996. Vital Health Stat 13. 1998 Nov;(139):1-119. PubMed

Extent of Measure Testing

Reliability Testing

Data/Sample. Agency for Healthcare Research and Quality (AHRQ) 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges.

Analytic Method. Expert panels and empirical analysis.

Testing Results. Perforated appendix occurs in one-fourth to one-third of hospitalized acute appendicitis patients. Based on empirical evidence, this indicator is precise, with a raw area level rate of 33.3% and a substantial standard deviation of 14.4%.

Relative to other indicators, a higher percentage of the variation occurs at the area level rather than the discharge level. However, the signal ratio (i.e., the proportion of the total variation across areas that is truly related to systematic differences in area performance rather than random variation) is low, at 26.5%, indicating that much of the observed differences in age-sex adjusted rates likely do not represent true differences across areas. Applying multivariate signal extraction methods can improve estimation of true differences in area performance.

Validity Testing

Data/Sample. AHRQ 2007 SID with 4,000 hospitals and 30 million adult discharges.

Analytic Method. Expert panels and empirical analysis.

Testing Results. Braveman et al. found that the rate of perforated appendix was 50% higher for patients with no insurance or Medicaid than health maintenance organization (HMO)-covered patients, and 20% higher for patients with private fee-for-service insurance. A follow-up study by Blumberg et al. concluded that the high rate of perforated appendix in the black population at an HMO may be explained by delay in seeking care, rather than differences in the quality of health care. Weissman et al. found that uninsured (but not Medicaid) patients are at increased risk for ruptured appendix after adjusting for age and sex.

Based on empirical results, areas with high rates of perforated appendix admissions tend to have lower rates of admissions for other ambulatory care sensitive conditions (ACSCs).

Refer to the original measure documentation for additional measure testing information.

Evidence for Extent of Measure Testing

National Quality Forum measure information: perforated appendix admission rate (PQI 2). Washington (DC): National Quality Forum (NQF); 2013 Jul 2. 11 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory/Office-based Care

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Regional, County or City

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age greater than or equal to 18 years

Target Population Gender

Either male or female

National Framework for Public Health Quality

Public Health Aims for Quality

Population-centered

Risk Reducing

Vigilant

National Strategy for Quality Improvement in Health Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Time window can be determined by user, but is generally a calendar year.

Denominator Sampling Frame

Geographically defined

Denominator (Index) Event or Characteristic

Clinical Condition

Geographic Location

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
Discharges, for patients ages 18 years and older, with any-listed International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for appendicitis. Discharges are assigned to the denominator based on the metropolitan area (MA) or county of the patient residence, not the metropolitan area or county of the hospital where the discharge occurred.

Note:

> The term MA was adopted by the United States (U.S.) Census in 1990 and referred collectively to metropolitan statistical areas (MSAs), consolidated metropolitan statistical areas (CMSAs), and primary metropolitan statistical areas (PMSAs). In addition, "area" could refer to either 1) Federal Information Processing Standard (FIPS) county, 2) modified FIPS county, 3) 1999 Office of Management and Budget (OMB) Metropolitan Statistical Area, or 4) 2003 OMB Metropolitan Statistical Area. Micropolitan Statistical Areas are not used in the Quality Indicator (QI) software.
> Refer to the original measure documentation for ICD-9-CM codes. See also the *Prevention Quality Indicators Appendices*.

Exclusions
Exclude cases:

- Transfer from a hospital (different facility)
- Transfer from a Skilled Nursing Facility (SNF) or Intermediate Care Facility (ICF)
- Transfer from another health care facility
- Major Diagnostic Categories (MDC) 14 (pregnancy, childbirth, and puerperium)
- With missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), principal diagnosis (DX1=missing), or county (PSTCO=missing)

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
Discharges, among cases meeting the inclusion and exclusion rules for the denominator, with any-listed International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes for perforations or abscesses of appendix

Note: Refer to the original measure documentation for ICD-9-CM codes.

Exclusions
Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Proxy for Health State

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Does not apply to this measure (i.e., there is no pre-defined preference for the measure score)

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

The predicted value for each case is computed using a logistic regression model and covariates for gender and age in years (in 5-year age groups). The reference population used in the model is the universe of discharges for states that participate in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., county, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.

Standard of Comparison

not defined yet

Identifying Information

Original Title

PQI 2: perforated appendix admission rate.

Measure Collection Name

Agency for Healthcare Research and Quality (AHRQ) Quality Indicators

Measure Set Name

Prevention Quality Indicators

Submitter

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]

Developer

Agency for Healthcare Research and Quality - Federal Government Agency [U.S.]

Funding Source(s)

Agency for Healthcare Research and Quality (AHRQ)

Composition of the Group that Developed the Measure

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicator (QI) measures are developed by a team of clinical and measurement experts in collaboration with AHRQ. The AHRQ QIs are continually updated as a result of new research evidence and validation efforts, user feedback, guidance from the National Quality Forum (NQF), and general advances in the science of quality measurement.

Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2015 Jan 5

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Mar

Measure Maintenance

Measure is reviewed and updated on a yearly basis

Date of Next Anticipated Revision

Spring 2016 (version 6.0, including International Classification of Diseases, Tenth Revision, Clinical Modification [ICD-10-CM] and International Classification of Diseases, Tenth Revision, Procedure Coding System [ICD-10-PCS] compatible software)

Measure Status

This is the current release of the measure.

This measure updates previous versions:

AHRQ QI. Prevention quality indicators #2: technical specifications. Perforated appendix admission rate [version 4.4]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2012 Mar. 1 p.
AHRQ quality indicators. Prevention quality indicators: technical specifications [version 4.4]. Appendices. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2012 Mar. 6 p.

Measure Availability

Source available from the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators (QI) Web site .

For more information, contact the AHRQ QI Support Team at E-mail: QIsupport@ahrq.hhs.gov; Phone: 301-427-1949.

Companion Documents

The following are available:

AHRQ quality indicators. Prevention quality indicators (PQI) parameter estimates [version 5.0]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 21 p. This document is available from the AHRQ Quality Indicators Web site .
AHRQ quality indicators. Prevention quality indicators benchmark data tables [version 5.0]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 9 p. This document is available from the AHRQ Quality Indicators Web site .
AHRQ quality indicators. Prevention quality indicators (PQI) composite measure workgroup. Final

report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Apr 7. various p. This document is available from the AHRQ Quality Indicators Web site .
HCUPnet: a tool for identifying, tracking, and analyzing national hospital statistics. [Web site]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); [accessed 2015 Sep 10]. HCUPnet is available from the AHRQ Web site .

NQMC Status

This NQMC summary was completed by ECRI on December 19, 2002. The information was verified by the Agency for Healthcare Research and Quality on January 9, 2003.

This NQMC summary was updated by ECRI Institute on April 6, 2004, February 18, 2005, February 27, 2006, June 15, 2007, November 26, 2008 and May 22, 2010.

This NQMC summary was reviewed and edited by ECRI Institute on May 16, 2011.

This NQMC summary was retrofitted into the new template on July 13, 2011.

This NQMC summary was updated by ECRI Institute on February 22, 2013 and again on December 1, 2015. The information was verified by the measure developer on January 19, 2016.

Copyright Statement

Production

Source(s)

AHRQ QI research version 5.0. Prevention quality indicator 2 technical specifications: perforated appendix admission rate. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2015 Mar. 2 p.

National Quality Forum measure information: perforated appendix admission rate (PQI 2). Washington (DC): National Quality Forum (NQF); 2013 Jul 2. 11 p.

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